

What is claimed is:

1. A hollow intervertebral spacer, comprising:

an elongated body having an outer surface and a longitudinal axis along a  
5 length of said body and defining a chamber therethrough along a second axis  
substantially perpendicular to said longitudinal axis;

a first arm connected to said body;

an opposite second arm connected to said body and facing said first arm; and  
said first arm and said second arm forming a mouth to said chamber.

10 2. The spacer of claim 1 wherein said body further comprises:

a tool engaging end defining a tool engaging hole for receiving a driving tool  
for implanting the spacer.

15 3. The spacer of claim 2 wherein said anterior surface further defines a  
slot surrounding said tool engaging hole.

4. The spacer of claim 1 wherein said outer surface defines threaded  
bone engaging portions.

20 5. The spacer of claim 1 wherein said wall is curved and said chamber is  
substantially C-shaped.

25 6. The spacer of claim 1 wherein said body is composed of a porous  
material.

7. The spacer of claim 1 wherein said body is composed substantially of  
cortical bone.

30 8. The spacer of claim 1 wherein said first arm is truncated relative to said  
second arm.

9. The spacer of claim 3 wherein said outer surface defines threaded bone engaging portions and said body is composed of cortical bone.

5 10. The spacer of claim 4 wherein said spacer is a bone dowel obtained from the diaphysis of a long bone having a medullary canal, said chamber including a portion of the canal.

10 11. The spacer of claim 1, further comprising an osteogenic material packed within said chamber.

12. The spacer of claim 11 wherein said osteogenic material comprises autograft, allograft, xenograft, demineralized bone, a calcium phosphate material, a bioceramic, bioglass, an osteoinductive factor or mixtures of thereof.

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13. An interbody fusion spacer, comprising:

a body having a wall defining a chamber, the body defining an opening in communication with said chamber, said wall having a first arm and an opposite second arm facing said first arm, said first arm and said second arm forming a mouth to said chamber, wherein said first arm is truncated relative to said second arm.

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14. The spacer of claim 13 wherein said body further comprises:

a tool engaging end defining a tool engaging hole for receiving a driving tool for implanting the spacer.

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15. The spacer of claim 14 wherein said anterior surface further defines a slot surrounding said tool engaging hole.

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16. The spacer of claim 13 wherein said body further comprises:

an outer surface defining threaded bone engaging surfaces.

17. The spacer of claim 13 wherein said wall is curved and said chamber is C-shaped.

5 18. The spacer of claim 13 wherein said spacer comprises cortical bone.

19. The spacer of claim 13 further comprising an osteogenic material packed within said chamber.

10 20. A graft comprising an elongated body consisting essentially of cortical bone, said body having an outer surface and a longitudinal axis along a length of said body and defining a chamber therethrough along a second axis substantially perpendicular to said longitudinal axis, said body further defining a channel defined along said longitudinal axis and in communication with said chamber and said outer  
15 surface.

21. The graft of claim 20 wherein said outer surface defines threaded bone engaging surfaces.

20 22. The graft of claim 20 further comprising an osteogenic material packed within said chamber.

23. A hollow intervertebral spacer, comprising:  
a cylindrical body having a wall, said wall having an outer surface and defining  
25 a chamber and an opening in communication with said chamber; and a channel defined in said wall in communication with said chamber and said outer surface.

24. The spacer of claim 23 wherein said outer surface defines threaded bone engaging portions.

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25. A bone graft having a C-shaped wall defining a chamber.

26. The spacer of claim 25 wherein said graft is a bone dowel obtained from the diaphysis of a long bone having a medullary canal, said chamber including a portion of the canal.

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27. A "C"-shaped dowel substantially composed of cortical bone.

28. The "C"-shaped dowel of claim 27 comprising a bone plug obtained from the diaphysis of a long bone, said dowel having a substantially "C"-shaped chamber.

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29. The "C"-shaped dowel of claim 28 having a chamfered insertion end.

30. The "C"-shaped dowel of claim 28 further comprising a tool engaging end defining an instrument attachment hole.

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31. The "C"-shaped dowel of claim 30 wherein the tool engaging end also defines a driver slot surrounding said hole.

32. The "C"-shaped dowel of claim 28 further comprising an external feature machined into an outer surface of the dowel.

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33. The "C"-shaped dowel of claim 32 wherein said feature includes a groove.

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34. The "C"-shaped dowel of claim 32 wherein said feature includes threads formed along a portion of the length of the dowel.

35. The "C"-shaped dowel of claim 27 having a length of between about 8mm to about 36mm.

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36. The "C"-shaped dowel of claim 35 having a diameter of between about 10mm and about 24mm.

37. The "C"-shaped dowel of claim 28 further comprising an osteogenic  
5 composition packed within said chamber.

38. The "C"-shaped dowel of claim 38 wherein said osteogenic composition comprises autogenous bone, bone morphogenetic protein, a calcium phosphate composition or a mixture of these.

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39. The "C"-shaped dowel of claim 27 obtained as an off-center transverse plug from the shaft of a donor's fibula, radius, ulna, humerus, femur or tibia.

40. A method of making a dowel which comprises machining an off-center  
15 transverse plug from the diaphysis of a donor's fibula, radius, ulna, humerus, femur or tibia, said plug having a diameter of between about 10mm and about 24mm and a depth (length) of between about 8mm and about 30mm such that the resulting dowel has, running through it, perpendicular to the long axis of the dowel, a substantially "C"-shaped chamber.

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41. The method of claim 40 further comprising chamfering one end of said plug to form a generally curved surface for ease of insertion of the dowel into an intervertebral cavity.

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42. The method of claim 40 further comprising machining an instrument attachment hole into one end of the dowel.

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43. The "C"-shaped dowel of claim 27 prepared by a process comprising machining an off-center transverse plug from the diaphysis of a donor's fibula, radius, ulna, humerus, femur or tibia, said plug having a diameter of between about 10mm and about 24mm and a length of between 8mm and about 36mm such that

the resulting dowel has, running through it, perpendicular to the long axis of the dowel, a substantially "C"-shaped chamber.

5        44.     The "C"-shaped dowel of claim 27 having an outer surface defining a surface feature .

      45.     The "C"-shaped dowel of claim 44 wherein said feature includes a groove.

10       46.     The "C"-shaped dowel of claim 44 wherein said feature includes threads formed along a portion of the length of the dowel.

      47.     The "C"-shaped dowel of claim 46 wherein said thread has a pitch of about 0.1".

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      48.     A spacer insertion tool, comprising:

          a housing having a proximal end and an opposite distal end and defining a passageway between said proximal end and said distal end;

          a shaft having a first end and an opposite second end, said shaft disposed  
20       within said passageway with said first end adjacent said distal end, said first end defining a spacer engager; and

          an occlusion member extendable from said distal end of said housing for blocking an opening defined in the spacer when said spacer engager is engaged to the spacer.

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      49.     The tool of claim 48, further comprising a fastener attached to said shaft and wherein said occlusion member includes a plate defining a groove, said groove disposed around said fastener so that said plate is slidable relative to said housing.

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50. The tool of claim 49 wherein said plate has a curved superior surface which approximates the outer surface of the spacer when said spacer engaging means is engaged to the spacer and said occlusion means is blocking the opening of the spacer.

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51. The tool of claim 48 wherein said shaft is slidingly disposed within said passageway.

52. The tool of claim 48 wherein said spacer engager is threaded for mating engagement with a threaded hole in a spacer.

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53. The tool of claim 48 wherein said spacer engager is a hex for mating engagement with an internal hex in a spacer.

54. An insertion tool for inserting a spacer into an intervertebral space, comprising:

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spacer engaging means for engaging the spacer; and

occlusion means separate from said spacer engaging means for blocking an opening defined in the spacer.

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55. The tool of claim 54 wherein said occlusion means includes a plate, said plate having a curved superior surface which approximates the outer surface of the spacer when said spacer engaging means is engaged to the spacer and said occlusion means is blocking the opening of the spacer.

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56. The tool of claim 54 wherein said spacer engaging means includes a post for engaging a hole in the spacer.

57. The tool of claim 56 wherein said post is threaded for mating engagement with a threaded hole in a spacer.

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58. The tool of claim 56 wherein said post is a hex for mating engagement with an internal hex in a spacer.

59. The tool of claim 74 wherein said spacer engaging means is a pair of  
5 prongs having opposite, facing spacer engaging members for grasping an outer surface of the spacer.

60. A driving tool for implanting an interbody spacer in a space between adjacent vertebrae, the spacer including a body defining a chamber and an opening  
10 in communication with the chamber, the body having a pair of arms facing one another and forming a mouth to the chamber, and an anterior surface defining a tool engaging hole, the tool comprising:  
spacer engaging means for engaging the tool engaging hole; and  
occlusion means for blocking said mouth.

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61. The tool of claim 60 further comprising a housing and wherein said occlusion means is extendable from said housing.

62. The tool of claim 60 wherein said spacer engaging means is a threaded  
20 post for threading engagement with the tool engaging hole.

63. A method for fusing two adjacent vertebrae, comprising the steps of:  
providing a spacer, the spacer including a body having a wall, said wall having an outer surface and defining a chamber and an opening in communication with  
25 said chamber, and a channel defined in said wall in communication with said chamber and said outer surface;

preparing the vertebrae and the intervertebral space between the vertebrae to receive the spacer;

30 placing the spacer into the intervertebral space after the preparing step so that the opening is in communication with at least one of the vertebrae; and  
packing osteogenic material into the channel after the placing step.



64. A method for fusing two adjacent vertebrae, comprising the steps of:  
providing a spacer, the spacer including a body having a wall, said wall having  
an outer surface and defining a chamber and an opening in communication with  
5 said chamber, and a channel defined in said wall in communication with said  
chamber and said outer surface;

preparing the vertebrae and the intervertebral space between the vertebrae to  
receive the spacer;

packing osteogenic material into the chamber;

10 blocking the channel; and

placing the spacer into the intervertebral space after the blocking step so that  
the opening is in communication with at least one of the vertebrae.

65. The method of claim 64 further comprising:

15 implanting a second spacer into the intervertebral space after the placing step,  
the second spacer having a body having a wall, said wall having an outer surface  
and defining a chamber and an opening in communication with said chamber, and  
a channel defined in said wall in communication with said chamber and said outer  
surface; and

20 orienting the first spacer and the second spacer so that the channels of the  
first and second spacers face one another.

66. The method of claim 65 further comprising packing an osteogenic  
material into the channels of the first and second spacers.

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67. The method of claim 64,

further comprising providing a tool of claim 27; engaging the spacer engager  
of the tool to the spacer; and

30 wherein the blocking step includes extending the occlusion member to block  
the channel.

68. The spacer of claim 1 wherein said body is composed of a metal, a ceramic, a polymer or a composite or alloy thereof.

69. The spacer of claim 13 wherein said body is composed of a metal, a ceramic, a polymer or a composite or alloy thereof.

70. The spacer of claim 1 wherein said outer surface includes a curved portion and a flattened portion.

71. The spacer of claim 13 wherein said body further comprises an outer surface that defines a curved portion and a flattened portion.